year. Since eradication, that annual burden represents a net saving. So in economic terms, the smallpox eradication program is likely to prove one of the best investments ever made in the annals of national and international public health.

The release of funds previously tied up by smallpox could have a massive impact on public health, provided they are diverted to health development programs. National eradication programs have been terminated, but the strengthened capacity for national surveillance has remained. Voluntary workers and members of the public have been sensitized to offer their services for further cooperation with public health services. Perhaps the best dividends are the hundreds of thousands of experienced, imaginative, tireless, and dedicated health workers who have remained in the countries and who serve as a solid base for implementing other important public health programs.

In sum, victory over smallpox has implications that go far beyond one disease. It provides an outstanding example of what can be achieved when countries throughout the world join together in a common cause. It reasserts human ability to change the world for the better. And it creates a firm, strong impetus toward Health for All by the Year 2000.

Source: Revised version of the article by Z. Jezek, *Ten Years without Smallpox*, WHO Features (No. 112), World Health Organization, Geneva, 1987.

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STATUS OF MALARIA PROGRAMS IN THE AMERICAS

Introduction

Malaria in the Americas, as a general health problem, became worse in 1986 than it had been previously, as demonstrated by an increase in the annual parasite incidence and a contraction of the control program coverage (expressed as a smaller number of housing units protected by insecticide applications).

Several countries showed concern about a rise in malaria mortality, particularly in regions where *Plasmodium falciparum* was prevalent. Overall, malaria persisted or became more intense in areas where it had already existed, while its transmission resumed in previously disease-free areas. Moreover, the disease retained its predominant role in the countryside, where housing and living conditions were primitive, and impaired the population's farming, ranching, fishing, mining, and other activities.

A total of 950,471 malaria cases were reported by all countries of the Americas in 1986. This total included cases discovered in countries and territories with no evidence of transmission and in areas where malaria eradication has been certified.

House-spraying with residual insecticides remained the chief control measure. While an effort was being made to maintain the coverage provided in prior years, the level attained was insufficient to accomplish the stated control purposes. Where domiciliary spraying of insecticides had diminished, no other control measures (aside from use of antimalarial drugs) were attempted to make up for this reduction, and so the incidence of malaria rose. In some countries the rising cost of insecticides adversely affected spraying programs, while in others inappropriate application operations were responsible.

The continued increase of malaria cases compelled the countries to step up use of antimalarial drugs, and programs were awakening to the need for expediting and decentralizing diagnosis so as to achieve greater efficiency in controlling the endemic through prompt treatment of patients locally. Meanwhile, migrations of refugees, displaced persons, and workers in national socioeconomic development projects continued to fuel the mounting incidence and spread of the disease.

A general shortage of resources—especially funds and personnel—persists in many countries of the hemisphere and tends to aggravate the situation. However, with PAHO's support the countries have stepped up their efforts to provide both basic and advanced training for their existing manpower.

Current Status of Control Programs

The population of the Region of the Americas grew from 400.5 million inhabitants in 1960 to 662.9 million in 1986. The population at risk of contracting malaria is estimated to have increased from 143.6 million (36% of the inhabitants) in 1960 to 263.4 million (40%) in 1986.

Since 1965 about nine million thick-smear blood tests a year have been performed to detect malaria parasites in the Americas. During the 1965–1986 period, the proportion of blood samples in which plasmodia were found rose from 2.7% (in 1965) to 9.5% (in 1986). Morbidity in the hemisphere's malarious areas more than doubled, rising from 165 cases per 100,000 inhabitants in 1965 to 361 cases per 100,000 in 1986 (Table 1).

Table 2 provides basic epidemiologic information on the 21 countries that had active control programs in 1986. This group of countries accounted for 89.1% of the blood samples examined and 99.8% of the positive cases detected in the hemisphere.

The 950,471 malaria cases reported in the Region in 1986 represents a substantial increase (57,236) over the total reported in 1985 and the largest number of cases reported in any year since 1958 (see Table 1). The increase took place in 12 of the 21 countries where

TABLE 1. Recorded malaria morbidity in the Americas, 1958–1986.

Year	Population (in thousands)		Blood specimens examined by thick-smear method			Morbidity per 100,000 inhabitants	
	Total (all areas)	In malarious areas	No. examined	No. positive	% positive	Total (all areas)	In malarious areas
1958	387,276	135,409	1,716,103	56,705	3.30	14.64	41.88
1959	394,606	145,920	2,749,117	75,612	2.75	19.16	51.82
1960	400,500	143,586	3,955,149	79,998	2.02	19.97	55.71
1961	416,008	147,292	5,341,004	99,639	1.87	23.95	67.65
1962	427,919	153,742	7,221,367	177,089	2.45	41.38	115.19
1963	434,950	152,021	7,903,156	227,026	2.87	52.20	149.34
1964	447,666	158,642	8,156,290	254,572	3.12	56.87	160.47
1965	455,527	146,389	9,069,950	241,462	2.66	53.01	164.95
1966	463,649	166,469	11,797,983	333,280	2.82	71.88	200.21
1967	474,868	169,901	11,609,228	369,388	3.18	77.79	217.41
1968	484,664	174,704	12,522,696	282,773	2.26	58.34	161.86
1969	491,483	176,325	12,179,190	323,782	2.66	65.88	183.63
1970	505,819	181,257	9,925,162	344,170	3.47	68.04	189.88
1971	513,544	185,492	10,134,212	338,416	3.34	65.90	182.44
1972	524,774	190,448	9,695,953	284,813	2.94	54.27	149.55
1973	535,109	195,528	9,400,682	280,276	2.98	52.38	143.34
1974	544,865	200,755	8,997,318	269,003	2.99	49.37	134.00
1975	555,676	205,872	9,276,878	356,692	3.84	64.19	173.26
1976	565,249	211,086	9,352,775	379,364	4.06	67.11	179.72
1977	576,942	215,550	9,274,480	398,925	4.30	69.14	185.07
1978	587,704	220,153	9,493,751	468,923	4.94	79.79	213.00
1979	600,263	226,361	8,630,653	515,271	5.97	84.47	227.63
1980	610,021	231,366	8,943,369	602,836	6.74	98.82	260.56
1981	627,375	239,260	9,100,529	629,629	6.92	100.36	263.16
1982	635,954	245,307	8,826,418	715,177	8.10	112.46	291.54
1983	639,212	249,327	9,113,611	830,700	9.11	129.96	333.18
1984	659,535	257,276	9,422,827	914,171	9.70	138.61	355.33
1985	665,777	259,838	9,342,769	893,235	9.56	134.16	343.77
1986	662,983	263,371	10,050,976	950,471	9.46	143.36	360.89

control activities are conducted (Argentina, Bolivia, Brazil, Colombia, Costa Rica, the Dominican Republic, French Guiana, Guyana, Mexico, Nicaragua, Panama, and Peru). This increase was sizable in Argentina, the Dominican Republic, Guyana, and Panama.

On the other hand, the number of cases reported in 1986 was below the 1985 figure in seven countries (Belize, Ecuador, El Salvador, Guatemala, Honduras, Paraguay, and Suriname). In Venezuela the number of cases registered in 1986 was the same as that registered in 1985; and in Haiti the case-detection system was substantially changed in late 1985, so that the lower figures reported for 1986 are not comparable to those of earlier years.

TABLE 2. The epidemiologic situation as of 1986 in the 21 countries of the Americas with active malaria control programs.

Country	Population of the malarious areas (in thousands)	Blood specimens examined by thick-smear method		Parasite species found					Epidemiologic indicators		
		No. examined	No. positive	*P. falciparum*	*P. vivax*	*P. malariae*	Mixed species	% *P. falciparum* alone	ABER[a]	SPI[b]	API[c]
Argentina	3,915	26,345	2,000	1	1,999	–	–	0.05	0.67	7.59	0.51
Belize	171	20,859	2,779	136	2,643	0	0	4.89	12.20	13.32	16.25
Bolivia	2,588	101,878	20,993	1,621	19,319	–	53	7.72	3.94	20.61	8.11
Brazil	59,367	3,363,962	443,627	240,664	199,857	9	3,097	54.25	5.67	13.19	7.47
Colombia	19,639	477,503	89,251	30,235	58,612	113	291	33.88	2.43	18.69	4.54
Costa Rica	753	113,720	790	19	768	0	3	2.41	15.10	0.69	1.05
Dominican Republic	6,337	427,694	1,360	1,359	–	1	–	99.93	6.75	0.32	0.21
Ecuador	5,569	275,865	51,430	11,985	39,445	–	–	23.30	4.95	18.64	9.24
El Salvador	4,325	182,622	23,953	2,324	21,558	–	71	9.70	4.22	13.12	5.54
Guatemala	3,333	453,401	42,609	1,387	41,184	–	38	3.26	13.60	9.40	12.78
French Guiana	84	6,436	979	731	241	–	7	74.67	7.66	15.21	11.65
Guyana	796	84,763	16,388	9,277	7,052	–	59	56.61	10.65	19.33	20.59
Haiti	4,925	262,582	14,363	14,363	–	–	–	100.00	5.33	5.47	2.92
Honduras	4,182	411,150	29,130	1,111	27,892	–	127	3.81	9.83	7.09	6.97
Mexico	42,570	1,217,848	130,915	1,062	129,808	–	45	0.81	2.86	10.75	3.08
Nicaragua	3,371	510,289	20,308	1,064	19,212	–	32	5.24	15.14	3.98	6.02
Panama	2,146	388,485	1,060	58	1,001	–	1	5.47	18.10	0.27	0.49
Paraguay	2,838	102,912	4,329	9	4,319	–	1	0.21	3.63	4.21	1.53
Peru	6,692	184,636	36,866	68	36,783	15	–	0.18	2.76	19.97	5.51
Suriname	296	50,969	1,316	1,002	314	–	–	76.14	17.22	2.58	4.45
Venezuela	13,951	289,504	14,361	3,131	11,221	1	8	21.80	2.08	4.96	1.03
Total	187,848	8,953,423	948,807	321,607	623,228	139	3,833	33.90	4.77	10.60	5.05

[a] ABER: Annual blood examination rate per 100 inhabitants.
[b] SPI: Slide-positive index (% slides positive).
[c] API: Annual parasite incidence per 1,000 inhabitants.

There is no important geographic connection between the countries and territories with no evidence of transmission. Malaria cases discovered within their borders have been imported from malarious areas, and changes from year to year may be interpreted as reflecting developments in other countries of the hemisphere. Overall, the number of cases reported from these countries (which rose from 1,206 in 1984 to 1,664 in 1986) kept pace with the steady rise in the Region as a whole. Of the 1986 total, 918 cases (55%) were found in the United States, 401 (24%) in Cuba, 302 (18%) in Canada, and the rest in the following countries and territories: 18 cases in Trinidad and Tobago; three cases each in Barbados and the Cayman Islands; two cases each in the Bahamas, Chile, and Puerto Rico; and one case each in Bermuda, Dominica, and Grenada.

Northern America. The only country in this area with endemic malaria is Mexico—where the number of cases rose from 85,501 in 1984 to 130,915 in 1986. As of 1986, Mexico accounted for 13.9% of all the reported malaria cases in the Americas. For Northern America as a whole the ABER (annual blood examination rate per 100 inhabitants) was 1.29 in 1986; the API (annual parasite incidence per 1,000 inhabitants) rose from 1.00 in 1983 to 1.62 in 1986; and the HSR (house-spraying rate per 1,000 inhabitants) rose from .354 in 1985 to .763 in 1986.

The Caribbean. Here the problem centered on Haiti and the Dominican Republic, which share the island of Hispaniola. In Haiti, the ABER dropped from 7.14% in 1984 to 3.89% in 1986; the number of registered cases also fell, reducing the API from 12.94 in 1984 to 2.13 in 1986; and the SPI (slide-positive index) also fell—from 18.13% to 5.47%. In the Dominican Republic, fresh outbreaks in 1986 raised the number of cases to 1,360, almost twice the 816 cases registered in 1985. In Belize, the API dropped from 28.7 per thousand inhabitants in 1983 to 16.6 in 1986. Guyana, Suriname, and French Guiana as a group reported 18,683 cases in 1986, over twice the number reported in 1984.

Central America and Panama. In this area the overall situation improved steadily, the number of reported cases falling from 184,734 in 1984 to 149,249 in 1985 and 117,850 in 1986 (the latter representing 12% of all the reported cases in the Americas). However, circumstances differed considerably in different countries during this 1984–1986 period, with El Salvador and Guatemala registering steady declines in the number of cases while Costa Rica, Honduras, Nicaragua, and Panama registered increases.

The Andean Subregion saw the number of registered cases decline from 193,953 cases in 1984 to 188,465 in 1985, and then rise to 212,901 (22.4%

of the hemispheric total) in 1986. During this three-year period the API rose in Bolivia, Colombia, Peru, and Venezuela, but declined in Ecuador. In all of these countries, the house-spraying rate remained low and very irregular from 1982 through 1986.

Brazil has registered increasing numbers of cases since 1982. The 443,627 cases registered in 1986 represented 46.7% of the hemispheric total in that year. The API rose from 1.75 per thousand inhabitants in 1982 to 3.20 in 1986.

The Southern Cone. Malaria increased in this area. Argentina reported 2,000 cases in 1986, almost triple the 1985 figure and over four times that of 1984. Paraguay reported 4,329 cases in 1986, slightly fewer than in 1985 but seven times more than in 1984.

Field Operations

The extent of insecticide use for vector control was about the same in 1985 and 1986. DDT use was practically unchanged from the previous year (except for liquid DDT, the use of which was reduced). The use of propoxur and fenitrothion declined. DDT continued to lead the insecticides employed, even though it had not been used for several years in El Salvador and Haiti, or since 1984 in Guatemala.

The following table shows the approximate numbers of persons protected by intradomiciliary sprayings of the various insecticides.

Insecticide	Inhabitants protected by intradomiciliary spraying, 1986
DDT	22,729,542
Malathion	20,609
Fenitrothion	1,305,550
Propoxur	499,129
Bendiocarb	238,484
Deltamethrin	150,172
Chlorphoxim	29,941
Others (unspecified)	464,437[a]
Total	25,446,864

[a] Guatemala.

Other vector control measures such as larviciding and sanitary engineering works were also carried out. For example, Mexico used larvicides in 1,078 localities over an area of 11,175 square kilometers, protecting a population of some 12,800,000 inhabitants; and El Salvador continued to employ sanitary engineering works to eliminate breeding places, protecting some 156,000 people within an area of 867 square kilometers.

Another principal prevention and control measure was mass distribution of antimalarial drugs to some 1,125,817 inhabitants at risk in 1986. In some countries antimalarial drugs were distributed selectively to 4,560,178 people. The latter figure is half of the close to nine million people to whom these drugs were selectively distributed in 1985. Of course, drug treatments for malaria infections were also provided. For instance, radical treatment of *Plasmodium vivax* infections was administered to 577,580 persons (confirmed cases and household contacts) in Mexico alone; all countries having control programs used drugs to treat acute malaria cases. Combined measures (insecticides plus medications) protected 14.7 million people in various parts of the Americas in 1986.

Some countries reported leaving populations at risk without control measures for the following reasons:

Reason	No. of unprotected inhabitants
Lack of funds	11,433,563
Sociopolitical problems	2,929,442
Access problems	874,441
Migratory populations	571,406
Other problems (unspecified)	3,870,018
Total	19,678,870

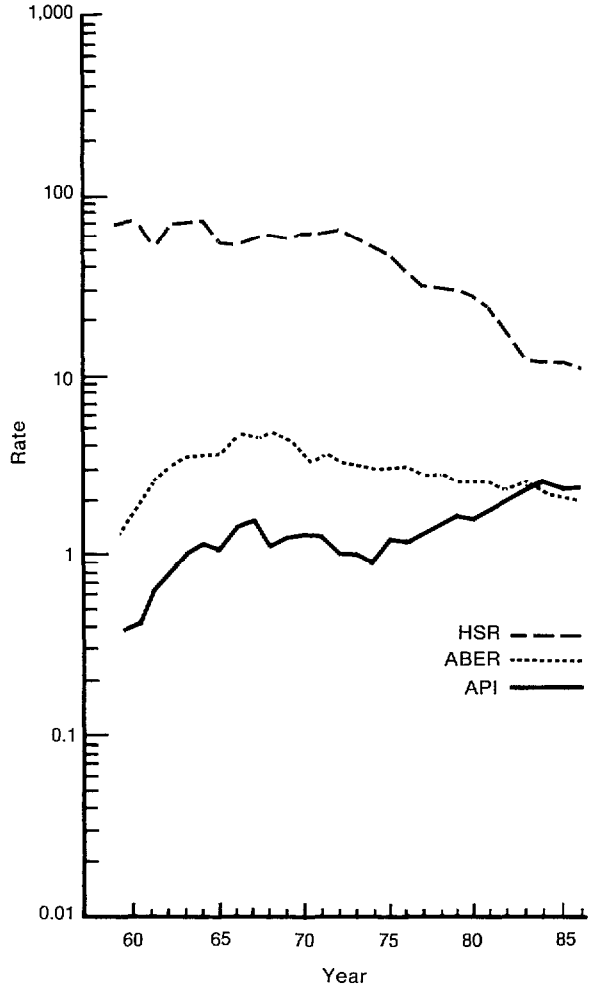
Overall, as Figure 1 shows, the HSR (number of house sprayings per 1,000 inhabitants) declined considerably from the beginning of the 1970s through 1986. During the same period the API (annual parasite index) rose steadily. The ABER (annual blood examination rate) began to fall in the latter 1960s and since then has exhibited a mild decline.

Special Problems

Parasite resistance. Within the Americas, parasite resistance to antimalarial drugs is confined to the countries of South America, being most prevalent in Brazil, Colombia, Ecuador, and Venezuela. Pockets of resistant *Plasmodium falciparum* frequently exhibit only limited (R-I) resistance, which permits effective use of the 4-aminoquinolines to treat acute malaria attacks, particularly at the primary care level.

It should be noted that resistance of *P. falciparum* infections to the pyrimethamine-sulfadoxine combination (PYR-SO) is on the rise. However, resistance to quinine does not appear to be

FIGURE 1. Malaria indicators in the 21 countries of the Americas with active malaria control programs (see Table 2 for country list). HSR = house-spraying rate per 1,000 inhabitants; ABER = annual blood examination rate per 100 inhabitants; and API = annual parasite incidence per 1,000 inhabitants.



high when the drug is used in association with PYR-SO or antibiotics. Therefore, these alternative treatments are coming into increasing use at secondary care levels for infections resistant to the 4-aminoquinolines and the PYR-SO combination.

Anopheline resistance. In confronting the problem of vector resistance to insecticides, one must deal with the use of pesticides in agriculture and other environmental actions in order to understand the problem better, study the genetics and mechanisms that produce resistance, make

appropriate predictions, and evaluate the possible repercussions of resistance upon the dynamics of malaria transmission.

There is a general consensus that specialized teams should be maintained that can detect and monitor the responses of malaria infections to drugs, and the resistance of anopheline vectors to insecticides and larvicides, in order to characterize the resistance mechanisms involved and the impact of resistance upon transmission. While resistance to insecticides could seriously undermine the malaria control strategy in some situations, particularly in areas with intensive cultivation of certain crops (cotton, sugarcane, and rice), much appears to depend on the economic, epidemiologic, and socioeconomic conditions prevailing in the specific area involved.

Program deficiencies. Although malaria has disappeared from the most developed areas and countries as a result of social and economic progress, control activities have rarely been based on a serious consideration of different patterns of social and economic development. Nevertheless, the process involved in achieving and maintaining control has depended not only upon the previous intensity of transmission, but also upon new trends in agriculture and mining and upon the current distribution of rural populations. The traditional malarious locality is rapidly giving way to a mobile rural population in quest of employment. Workers are temporarily concentrated in primitive camps and wall-less sheds under conditions favorable for malaria transmission. In some areas a population density is developing that far exceeds all the resources of the general and specialized health services. In others, services are not used when they should be. The slowness of the conversion from an eradication to a control strategy often allows epidemics to occur. In some areas on the Pacific littoral of Central America, for example, mesoendemic conditions have given rise to epidemics because of the difficulty involved in maintaining effective control. The same has happened in Ecuador and Paraguay in South America.

In most of the hemisphere's rural malarious areas, antimalaria services antedated emergence of the general health services infrastructure. Indeed, malaria units are still the only health services permanently available to many outlying areas. Though efforts have been made to integrate these antimalaria units into slowly growing basic health services, such efforts have commonly failed to spur the growth of those services while seriously weakening malaria control. Indeed, in many situations the recrudescence of malaria has promoted a decision not to integrate because the general health services have not been given the resources needed to perform their functions.

House-spraying with insecticides and mass drug administration are generally effective measures. Their use can drastically reduce both the transmission and prevalence of malaria and, if sustained long enough, may even eliminate the malaria reservoir. However, when the effectiveness of these measures falls off or they are discontinued, the old levels of endemicity return unless the gains are maintained by other means. In contrast, more lasting effects are obtained by eliminating anopheline breeding places and improving housing and living conditions.

Incorporation of malaria control into general health services. In some countries of the Americas, vertical activities or health campaigns have been combined under a common administration that is extended from the center to the periphery. This has improved the efficiency of control activities in Brazil, Colombia, Guatemala, and Venezuela. The affected campaigns have remained centralized in all aspects of problem characterization and control. However, the basic health services have been made responsible for continued medical care of health problems unrelated to the direct campaigns.

In some countries plans are being made to transfer the responsibility for case diagnosis and treatment, as well as for collection and analysis of epidemiologic information, to the general health system. This means incorporating the network of voluntary malaria collaborators and their logistical support services into the system under the aegis of the primary health care strategy.

Decentralization of the organization carrying out control activities can permit a more timely and appropriate response to health problems. However, most of the countries have difficulties in modifying existing specialized services. The greatest problem in this regard is lack of an infrastructure that not only provides entry to the national health system, but also effectively encourages the whole population to recover and preserve its health.

Control measures and primary health care. Antimalaria activities currently depend on diagnosis and timely treatment of cases. Treatment at the most peripheral level by health workers and voluntary collaborators must rely on clinical judgment. Such treatment, based on the diagnosis of symptoms, should be made with safe and effective drugs administered orally or by suppository. Serious cases or ones with therapeutic deficiencies should be referred to a second level of the health system and treated with dihydrofolin-reductase inhibitors or parenteral application of quinine. The use of second-line drugs should be based on diagnostic confirmation by microscopy. In areas where the frequency of R-III resistance suggests that treatment with first-line drugs (such as chloroquine or amodiaquine) may pose a high risk to the patient at the peripheral level, it is essential to employ the microscopic diagnosis facility at the periphery.

Chemoprophylaxis as a public health measure in the region of the Americas is not justified, since protection of the population that inhabits the endemic areas is based on access to timely diagnosis and proper treatment. Chemoprophylaxis should be limited to con-

trolled groups of visitors coming from nonendemic areas during their stay in transmission areas.

It is becoming necessary to disseminate knowledge about the management of serious and complicated cases of malaria.[1]

In view of the flexible approaches currently needed for implementation of primary health care strategies, more studies on malaria epidemiology, particularly vector ecology, will be needed in order to design and use successful integrated control methods. Also, before the countries carry out complex and expensive activities, they should identify priority areas for control, consider the local epidemiologic situation, and select measures based on appropriate and available scientific technology that are capable of resolving the problem and of being applied through the general health services. The cost of these activities should be within the means of the health system, since it will usually be necessary to sustain and maintain such activities for long periods of time.

In many areas particular problems are posed by residual malaria foci into which migrants move seeking employment, especially in agricultural projects. This circumstance creates a need to improve the peripheral malaria control infrastructure in terms of facilities, personnel, and community access.

More generally, epidemiologic information mechanisms should be adapted in order to collect, present, and analyze data relating to malaria control activities, surveys, community participation, and mobilization of resources so that appropriate information may be used at the decision-making level to develop effective programs. Almost invariably within the Region of the Americas only the basic eradication campaign indicators are used—these being the ABER, API, and HSR.

Recently, renewed interest has been shown in reviewing control program information subsystems and incorporating data derived from indicators such as morbidity, mortality, incidence, and prevalence. In this vein it should be noted that active case-searching is a very expensive operation with little yield, whereas so-called "passive" case-searching with community participation involving public health representatives, voluntary collaborators, private enterprises, and the general health services is much more productive with regard to timely detection and treatment of malaria cases. Also, organization of the referral system presents a special set of problems—especially regarding monitoring to avoid errors and duplication in the registration, management, and treatment of malaria patients.

[1] World Health Organization. Malaria action programme. *Trans R Soc Trop Med Hyg* 80 (Supplement): 1–50, 1986.

In addition, monitoring the in vivo response to treatment requires a subsystem organized for collection and analysis of parasitoscopic diagnoses and for follow-up of the results obtained in treating serious cases.

It is also becoming necessary to develop methodologies for forecasting, registering, and following up epidemics, the evolution of parasite resistance to drugs, and the evolution of vector resistance to insecticides. The systems using these methodologies should include field ecologic and meteorologic information—supplemented as appropriate by information obtained from satellites and other sources.

Source: Pan American Health Organization, Status of Malaria Programs in the Americas, XXXV Report, PAHO document CD32/INF/2 prepared for the XXXII meeting of the PAHO Directing Council, Washington, D.C., 1987.

AAAO

EPIDEMIC SCABIES AND ASSOCIATED ACUTE GLOMERULONEPHRITIS IN TRINIDAD[1]

Scabies is caused by the mite *Sarcoptes scabiei (1)*. The female mite is most active at night, burrowing into the skin to feed; and this activity causes an intense irritation that leads to scratching.

The sites most commonly affected are the webs of the fingers, anterior surfaces of the wrists and elbows, anterior axillary folds, scrotum and penis, nipples and abdomen, buttocks, and the area behind the knees. Scabies may also be found in unusual locations (e.g., on the head and scalp of infants); and new forms of scabies (scabies incognita) may arise after treatment with topical agents such as corticosteroids *(2)*. Scabies can also produce erythema, pseudolymphomatous nodular lesions, urticaria-like papules, and other vesicular or bullous lesions. This variability probably reflects the host's immunologic response to the ectoparasite. In immunodeficient individuals, a generalized dermatitis with extensive scaling is common.

Epidemiologic studies have shown that human scabies has a global presence affecting all races and social classes and is present in all climatic zones from the arctic to the equator. Worldwide, there are estimated to be over 300 million cases of scabies per year *(3)*. In most countries, however, scabies is not a reportable disease and research has tended to stagnate, mainly because of difficulty in developing a successful laboratory method for culturing the mites. Countries where the reporting of scabies is mandatory are Czechoslovakia, Denmark, Norway, and Poland.

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[1] Reported by H. F. M. Reid, Scientific Director, Streptococcal Unit, Trinidad and Tobago Public Health Laboratory, Federation Park, Port of Spain, Trinidad; and by T. Poon-King, Consultant Physician, San Fernando General Hospital, Trinidad.